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# NAVAL WEAPONS STATION EARLE FLEET MOORINGS UNDERWATER INSPECTION REPORT

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MAY 1983

OCEAN ENGINEERING  
AND CONSTRUCTION PROJECT OFFICE  
CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
WASHINGTON, D.C. 20374

FPO-1-83 (16)

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Ocean Engineering  
& Construction  
Project Office  
CHESNAVFACENGCOM

7a. NAME OF MONITORING ORGANIZATION

6c. ADDRESS (City, State, and Zip Code)

BLDG. 212, Washington Navy Yard  
Washington, D.C. 20374-2121

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Under the COMNAVFACENGCOM Fleet Mooring Maintenance (FMM) Program, CHESNAVFAC-  
ENGCOM has been assigned the responsibility to plan and conduct periodic diver  
inspections of all fleet moorings worldwide. In carrying out this respon-  
sibility, CHESNAVFACENGCOM designated an Engineer-in-Charge (EIC) to (Con't)  
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22a. NAME OF RESPONSIBLE INDIVIDUAL

Jacqueline B. Riley

DD FORM 1473, 84MAR

22b. TELEPHONE

202-433-3881

22c. OFFICE SYMBOL

SECURITY CLASSIFICATION OF THIS PAGE

BLOCK 19 (Con't)

provide inspection planning and on-site technical direction for the underwater inspection of fleet moorings located at the Naval Weapons Station (NWS) Earle, New Jersey. The actual underwater portion of the inspection was performed by divers of Underwater Construction Team One (UCT-1). A total of three fleet moorings are currently operated and maintained by NWS Earle.

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## **NWS EARLE FLEET MOORING INSPECTION REPORT**

### **1.0 INTRODUCTION**

#### **1.1 Background**

Under the COMNAVFACENGCOM Fleet Mooring Maintenance (FMM) Program, CHESNAVFACENGCOM has been assigned the responsibility to plan and conduct periodic diver inspections of all fleet moorings worldwide. In carrying out this responsibility, CHESNAVFACENGCOM designated an Engineer-in-Charge (EIC) to provide inspection planning and on-site technical direction for the underwater inspection of fleet moorings located at the Naval Weapons Station (NWS) Earle, New Jersey. The actual underwater portion of the inspection was performed by divers of Underwater Construction Team One (UCT 1). A total of three fleet moorings are currently operated and maintained by NWS Earle.

#### **1.2 Mooring Historical Data**

Normally, NWS Earle operates and maintains five fleet moorings. However, about 2 years ago, during 70 knot winds, two of the five buoys broke loose from their mooring chain and drifted free. The buoys were subsequently located and returned to Earle. However, the risers, chain legs, sinkers, and anchors for both of these moorings are apparently buried in the mud bottom and their precise locations are unknown. Figure 1 shows the geographic location of the NWS Earle's fleet moorings while Figure 2 shows the planned and actual locations of these moorings in relation to Pier One at NWS Earle's Leonardo facility.

During the 10-14 April 1983 time frame, the CHESDIV/UCT 1 inspection team inspected the three existing moorings, repaired one mooring, inspected and inventoried the ashore Fleet Mooring Inventory (FMI), and attempted (unsuccessfully) to locate the two missing assemblies of mooring material. In addition, using transits, the actual positions of the three buoys were sighted from known ashore positions (see Figure 3). NWS Earle provided a YTB as the diving platform.

### **2.0 INSPECTION PROCEDURES**

**2.1 Inspection Objectives.** The purpose of the mooring inspections is to determine the general physical condition of the buoys and chain assemblies and, when possible, to verify or update existing as-built and maintenance records. Divers inspect only a portion of the submerged buoy hull and chain assemblies in

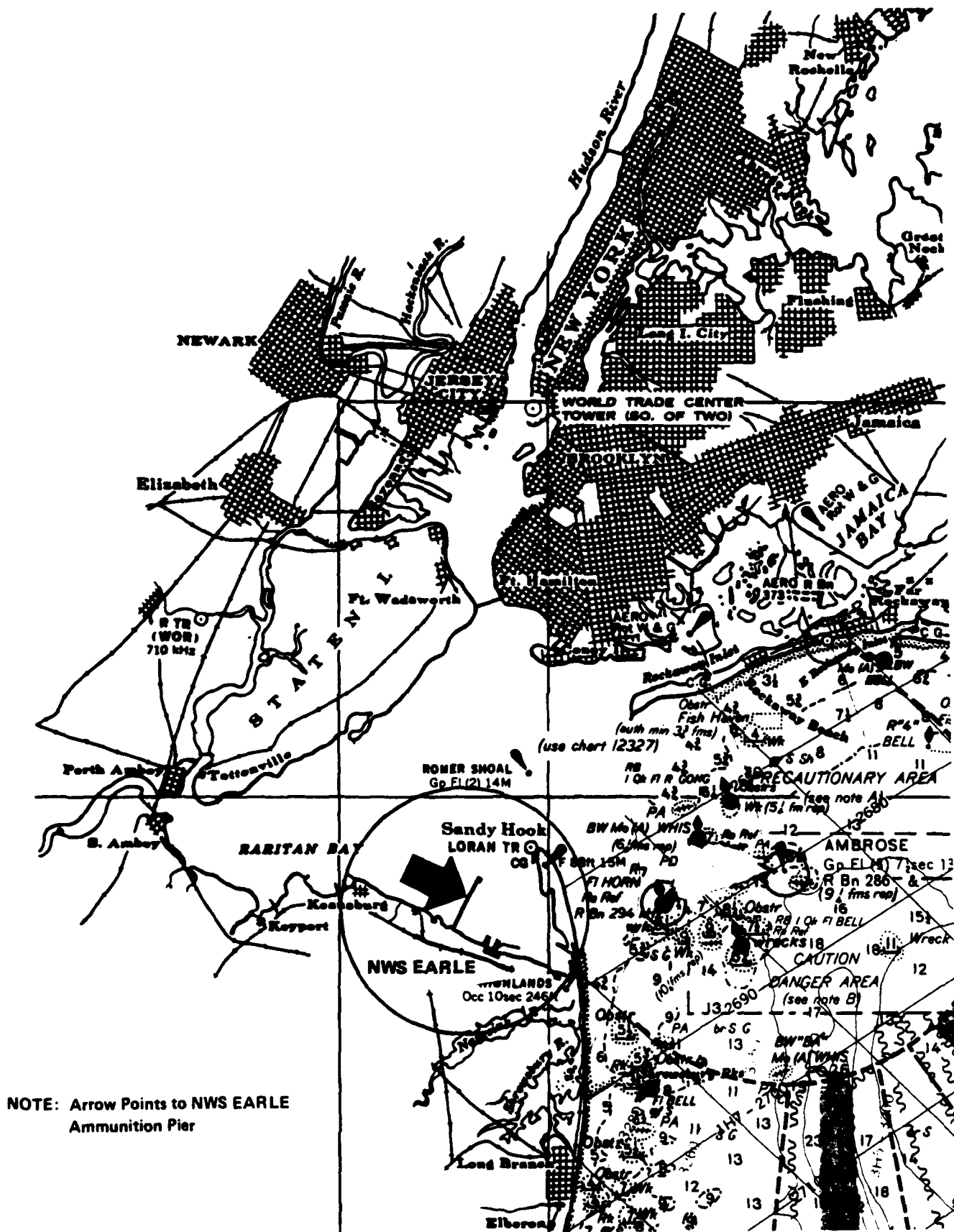


Figure 1. NWS Earle Fleet Mooring Locations

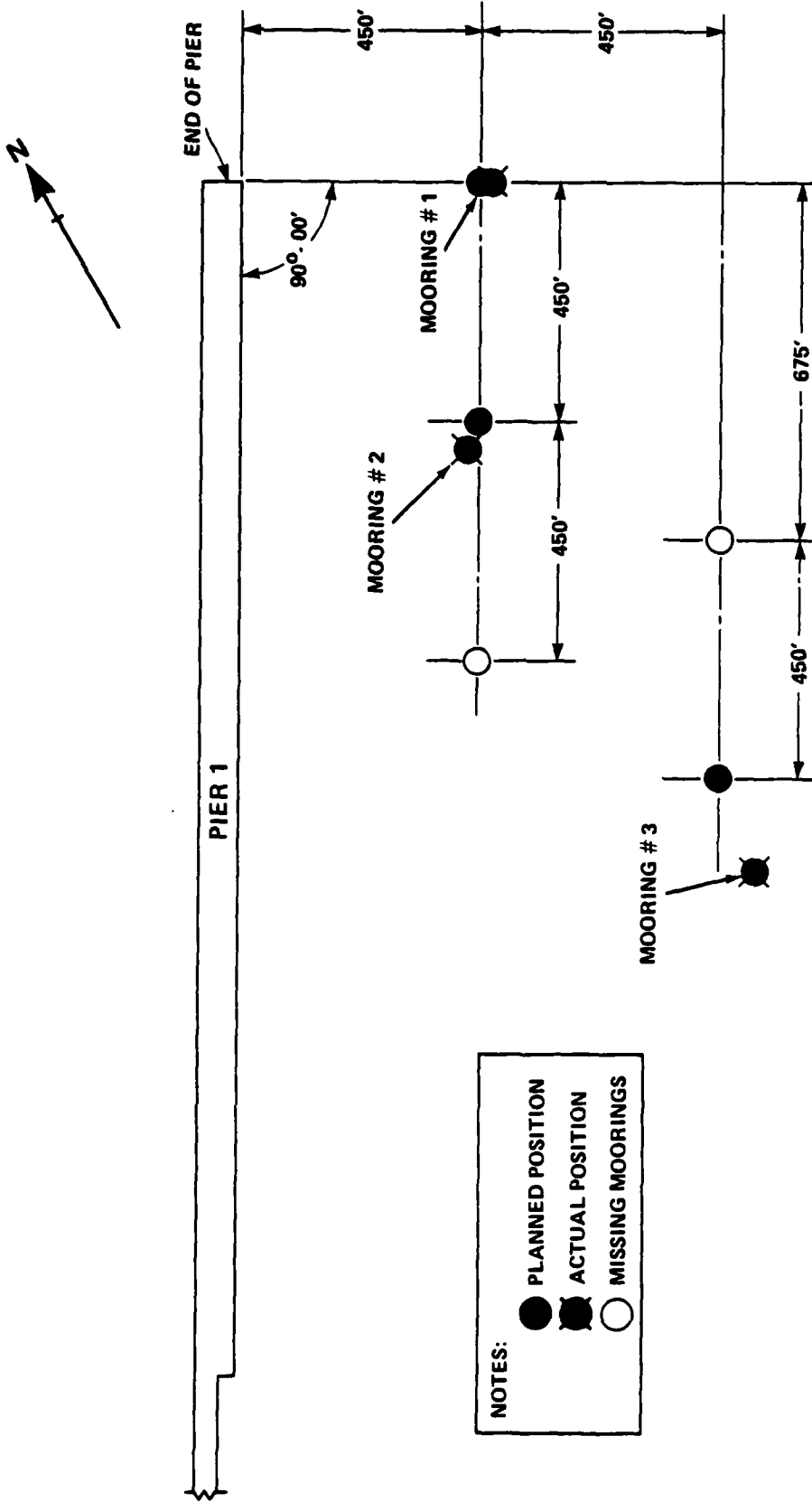


Figure 2. NWS Earle Moorings Locations

TRANSIT READINGS:

TRANSIT A:	TRANSIT B:
B <sup>1</sup> - L 89°15"	B <sup>1</sup> - R 17°23"
B <sup>2</sup> - L 50°08"	B <sup>2</sup> - R 22°55"
B <sup>3</sup> - L 37°25"	B <sup>3</sup> - R 76°52"

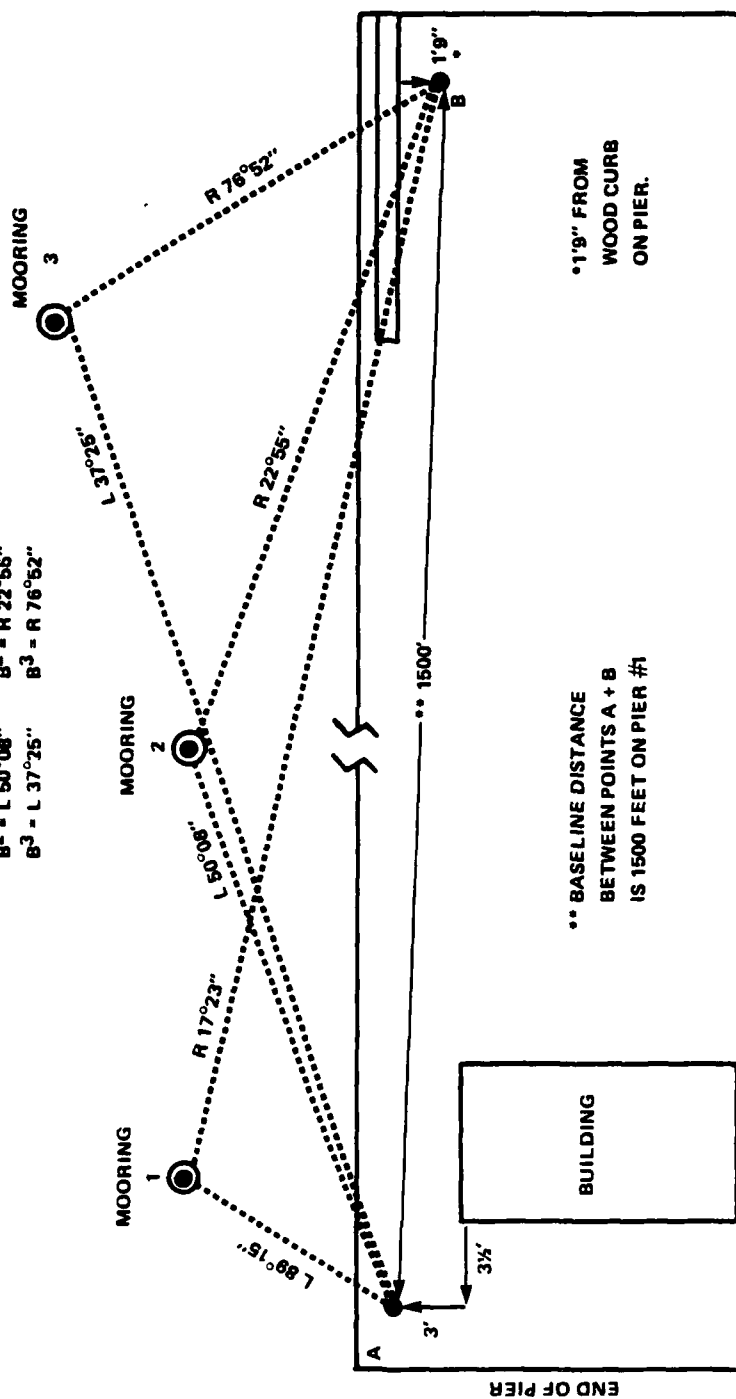


FIGURE 3. NWS EARLE FLEET MOORING POSITIONS



order to compile a general description of the mooring's condition. The existence of fairly consistent measurements during this inspection provides a good indication of the mooring's overall condition. It should be kept in mind that periodic underwater inspections are intended as an expedient and relatively inexpensive supplement to accurate maintenance records. As such, they cannot fully substitute for a complete inspection involving recovery of the mooring and the measurement and evaluation of each component.

One of the more important parameters used to evaluate the condition of a mooring is chain wire diameter. After cleaning to bare metal, a selective sampling of the wire diameter of chain links and connecting hardware is taken in order to determine the amount of deterioration due to corrosion and wear. "Single Link" measurements are taken where chain is slack, and detect only corrosion loss. "Double Link" measurements, taken where two links connect under tension, detect the combined effects of corrosion and wear. Chain links and other components which measure 90 percent or greater of original wire diameter are considered to be in "good" condition; measurement between 80 percent and 90 percent of original diameter is considered "fair" condition and is cause for the mooring to be downgraded in classification; any measurement less than 80 percent is considered "poor" and is cause for the mooring to be declared unsatisfactory for fleet use.

Standard underwater inspection procedures do not call for the inspection of any part of the mooring which has been buried. Ground legs and risers are observed only to the point at which they become buried; no attempt is made to locate and inspect anchors or other mooring materials which are not readily visible.

**2.2 Buoy.** Each buoy was inspected and its general condition noted. The buoy's diameter was measured, its paint was checked for cracking, chipping, and peeling, and its hull closely examined for physical damage and thickness of marine growth. The bottom of the hawse pipe and the rubbing casting were also inspected.

Each buoy's fenders and chafing rails were checked for integrity and secure connection to the buoy. The topside jewelry was measured with calipers and inspected for wear.

**2.3 Riser.** To determine chain wear, each riser was inspected by taking three consecutive double link measurements, using calipers, just below the hawse pipe, at the mud line, and about halfway in between. Although the As-Built Drawing of the moorings (Figure 4) indicates that each riser is about 48 feet long (including about 18 feet of "buoy chain") only a total of about 18 feet of chain was visible before it vertically entered the mud.

**2.4 Ground Ring.** Buried in the bottom.

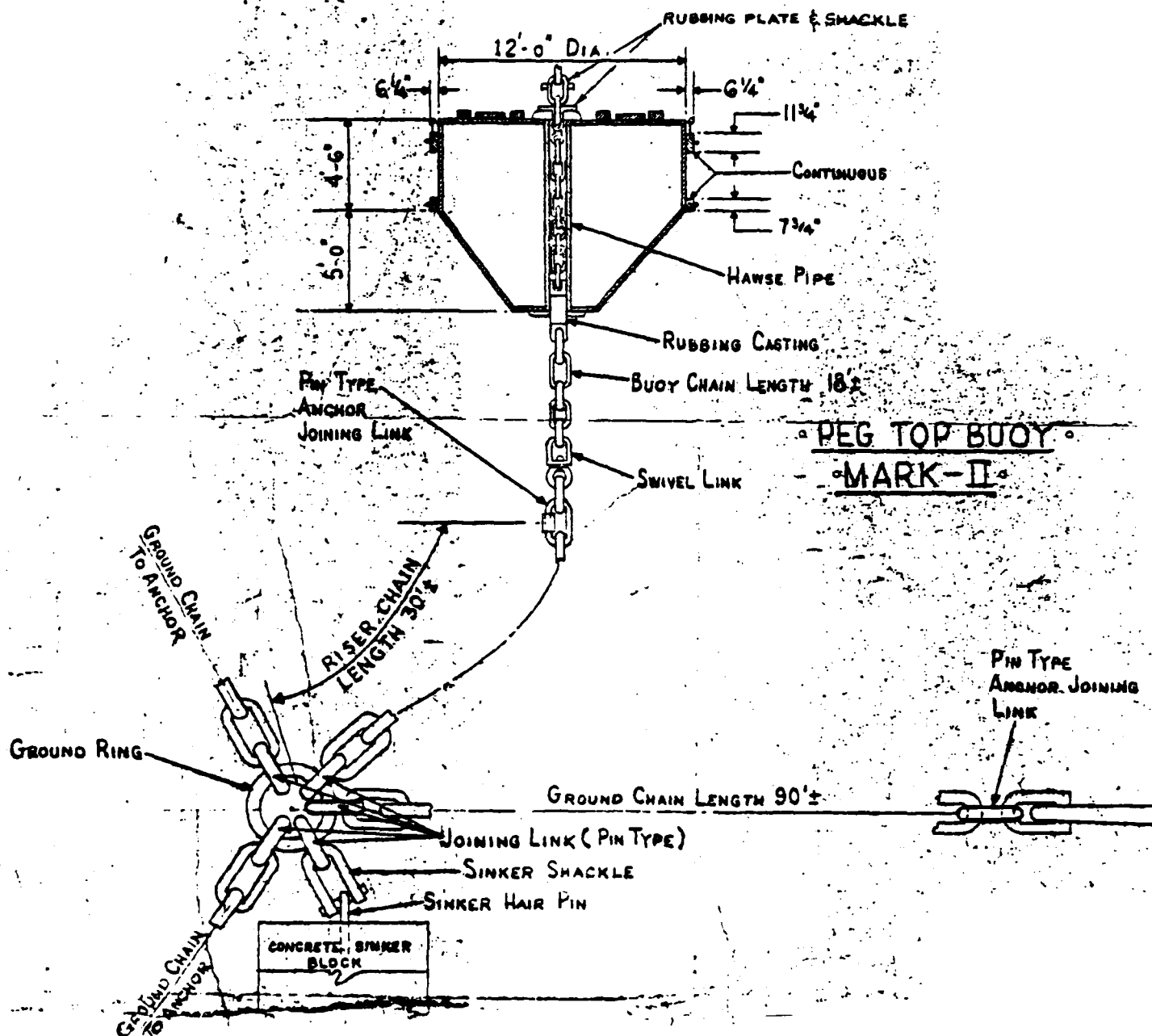


Figure 4. As-Built Drawing

2.5 Ground Legs. Buried in the bottom.

2.6 Concrete Sinker. Buried in the bottom.

2.7 Anchors. Buried in the bottom.

### 3.0 INSPECTION SUMMARY

The information gathered during the inspection indicates the following:

- None of the three buoys are numbered. Each is coated with only a dark grey primer type paint. All three have hawse pipes and rubbing castings and are in good condition.
- In all three moorings, the ground ring, ground legs, anchors, and lower portion of the riser were buried and their condition could not be determined.
- Mooring Number One has a 2 1/4-inch chain riser which was measured to be greater than 90 percent of its original wire diameter. The riser has no swivel and the center section of a detachable link was found to be missing. UCT 1 divers replaced this detachable link with a spare.
- Mooring Number Two has a 2 1/4-inch chain riser which was measured to be between 80 and 90 percent of its original wire diameter. The buoy has a 20° to 25° list.
- Mooring Number Three has a 2-inch chain riser which was measured to be between 80 and 90 percent of its original wire diameter. The buoy is in a position about 150 feet south of its planned position.

#### 4.0 MOORING INSPECTION COMMENTS AND RECOMMENDATIONS

As a result of an evaluation of the data gathered during the inspection, the following comments and recommendations are pertinent:

- Only one serious material deficiency (broken detachable link) was noted, and this was corrected by UCT 1 divers.
- The watertight integrity of the buoy in Mooring Number Two should be checked for possible leaks.
- Attempts should be made to locate the chain and anchor assemblies which have been buried since two buoys broke loose about two years ago. This material would be a significant addition to the NWS Earle inventory ashore which at present does not include any chain or chain accessories.
- A swivel should be inserted in the riser of Mooring Number One.
- Due to measured riser chain wear, Moorings Number 2 and 3 would normally be downgraded to a lower classification. However, since the chain is oversized, these moorings are in satisfactory condition for continued use in their current capacity as Class E moorings.

**ANNEX A**

**FLEET MOORING  
INSPECTION RESULTS**

CHESNAV FACENGCOM REPORT FPO-1-83(18), "NWS EARLE FLEET MOORING UNDERWATER INSPECTION REPORT," MAY 1983

## SUMMARY OF INSPECTION

### MOORING NO. 1

#### Buoy

This is a 12-foot-diameter Mark II Peg Top type buoy. It has two wooden fenders and two wooden chafing rails, each covered with a 2 1/2-inch-wide metal strip. The buoy has a hawse pipe, and its rubbing casting is in good condition. The buoy is not numbered and is painted with only a dark grey primer coating. This Peg Top shows no evidence of rust, and has a growth-free bottom.

#### Riser

The wire diameter of the riser chain is 2 1/4 inches which is a half-inch larger than required for a Class E (1 3/4-inch diameter) mooring. Double link measurements in three positions determined that the chain is greater than 90 percent of its original wire diameter. Only 20 links of the riser were observed before the chain entered the silt-covered mud bottom. There was no swivel in that portion of the riser chain that was visible. The tenth link below the hawse pipe is a detachable link which had its center section missing. Since a barge was moored to this buoy, NWS Earle Port Services was immediately advised of the broken detachable link and a recommendation made that the barge be moved to another mooring. This recommendation was accepted and the barge was towed and moored to Mooring Number Three.

The morning after the underwater inspection, a spare detachable link was located in NWS Earle's Public Works Department. UCT 1 divers then removed the broken detachable link and inserted the spare. By noon, the mooring was back in a fully operational condition.

#### Ground Ring/Ground Legs/Anchors

None visible.

#### Recommendation

This mooring is in satisfactory condition for continued use in its current capacity as a Class E mooring.

CHESNAVFACENGCOM REPORT FPO-1-83(18), "NWS EARLE FLEET MOORING UNDERWATER INSPECTION REPORT," MAY 1983

MOORING NO.: 1 CLASS: E LOCATION: UNSEABLE LAT: 40° 26' 49" LONG: 74° 05' 17"  
 WATER DEPTH: 18 FT ANCHOR SIZE/TYPE: STICKLESS BUOY TYPE: DE 6 TOP (HAWSE PIPE)

BOTTOM TYPE: ☐ SAND ☒ MUD ☐ CLAY ☐ CORAL ☐ ROCK Visibility: 1 FT D = depth NI = not inspected, inaccessible

COMPONENTS		NI	CONDITION							COMMENT	
			NEW	SINGLE LINK %			DOUBLE LINK %				D
				90+	80+	80-	90+	80+	80-		
BUOY HARDWARE											TWO WOODEN CHAFFIN-RAILS WITH METAL STRIPS. TWO WOODEN FENDERS WITH METAL STRIPS. LIGHT <del>ANCHOR</del>
TOP - 2 1/2" SHACKLE WITH LEGS (F)											NO RUST. ELEVENTH LINK DOWN HAS NO STUD. TWENTY LINKS TO BOTTOM. NO SWIVEL IN RISER. TENTH LINK DOWN IS A 2 1/4" DETACHABLE WITH THE CENTER SECTION MISSING. DOUBLE LINK MEASURED 4 1/8" (92%)
RISER	NEAR BUOY		3 1/4"				✓				
	MIDDLE		↓				✓				
	NEAR GRD RG		↓				✓				
GROUND RING			BURIED								
GROUND LEG NO. A	UPPER END		BURIED								
	MIDDLE										
	ENTERS BOTTOM										
GROUND LEG NO. B	UPPER END		BURIED								
	MIDDLE										
	ENTERS BOTTOM										
GROUND LEG NO. C	UPPER END		BURIED								
	MIDDLE										
	ENTERS BOTTOM										
GROUND LEG NO. D	UPPER END										
	MIDDLE										
	ENTERS BOTTOM										

DATE: 10 APRIL ENGINEER-IN-CHARGE: TJ HANAHAN DIVERS: MCLEARY / TAGALLS

**MOORING NO. 1**

**AS-BUILT**

**Top Jewelry**

2 1/2-inch F shackle with lugs

**Buoy**

12-foot Peg Top

**From Bottom of Hawse Pipe**

Nine 2 1/4-inch A Links

One 2 3/8-inch Detachable Link

Ten 2 1/4-inch A Links

The remainder of the mooring was buried and was not inspected.



## SUMMARY OF INSPECTION

### MOORING NO. 2

#### Buoy

This is a 12-foot-diameter Mark II Peg Top type buoy. It has two wooden fenders and two wooden chafing rails, each covered with a 2 1/2-inch-wide metal strip. The buoy has a hawse pipe, and its rubbing casting is in good condition. The buoy is not numbered and is painted with only a dark grey primer coating. This Peg Top shows no evidence of rust, and has a growth-free bottom. This buoy has a 20° to 25° list which may be caused by water leaking into the buoy.

#### Riser

The wire diameter of the riser chain is 2 1/4 inches which is a half inch larger than required for a Class E (1 3/4-inch diameter) mooring. Double link measurements in three positions determine that the chain is between 80 and 90 percent of its original wire diameter. Only 19 links of the riser were observed before the chain entered the bottom. The sixth and eighth links below the hawse pipe are 2 5/8-inch detachable links, while the seventh is a 2 1/2-inch swivel. The twelfth link down has no stud.

#### Ground Ring/Ground Legs/Anchors

None visible.

#### Recommendation

The buoy should be thoroughly inspected in order to determine the cause of its list.

Due to the measured riser chain wear, this mooring would normally be downgraded to a lower classification. However, since the chain is oversized, the mooring is in satisfactory condition for continued use in its current capacity as a Class E mooring.

It should be noted that the removal of studs from chain links is not a recommended practice since it affects the structural integrity of the link and causes a reduction in chain strength. Again, because of the use of oversized chain in this case, the missing studs do not prevent continued use as a Class E mooring.

CHESNAVFACENGCOM REPORT FPO-1-83(16), "NWS EARLE FLEET MOORING UNDERWATER INSPECTION REPORT," MAY 1983

LONG: 74 05 17

BUOY TYPE: PEG TOP (HOUSE PIPE)

**D = depth**

**NI = not inspected, inaccessible**

[illegible]

DATE: 12 APRIL 1983 ENGINEER-IN-CHARGE: TJ P. Flanagan  
DIVERS: HAYES / MUEWTK/FILVICZ

**MOORING NO. 2**

**AS-BUILT**

**Top Jewelry**

2 1/2-inch F shackle with lugs

**Buoy**

12-foot Peg Top

**From Bottom of Hawse Pipe**

Five 2 1/4-inch A Links

One 2 5/8-inch Detachable Link

One 2 1/2-inch Swivel

One 2 5/8-inch Detachable Link

Three 2 1/4-inch A Links

One 2 1/4-inch A Link with no stud

Seven 2 1/4-inch A Links

The remainder of the mooring was buried and not inspected.

## SUMMARY OF INSPECTION

### MOORING NO. 3

#### Buoy

This is a 12-foot-diameter Mark II Peg Top type buoy. It has two wooden fenders and two wooden chafing rails, each covered with a 2 1/2-inch-wide metal strip. The buoy has a hawse pipe, and its rubbing casting is in good condition. The buoy is not numbered and is painted with only a dark grey primer coating. This Peg Top shows no evidence of rust, and has a growth-free bottom. This buoy's position is about 150 feet south of its planned position.

#### Riser

The wire diameter of the riser chain is 2 inches which is a quarter-inch larger than required for a Class E (1 3/4-inch diameter) mooring. Double link measurements in three positions determined that the chain is between 80 and 90 percent of its original wire diameter. Only 19 links of the riser were observed before the chain entered the bottom. The ninth and eleventh links below the hawse pipe are 2 1/8-inch detachable links, while the tenth is a 2-inch swivel. The sixth and thirteenth links have no studs.

#### Ground Ring/Ground Legs/Anchors

None visible.

#### Recommendation

Due to the measured riser chain wear, this mooring would normally be downgraded to a lower classification. However, since the chain is oversized, the mooring is in satisfactory condition for continued use in its current capacity as a Class E mooring.

It should be noted that the removal of studs from chain links is not a recommended practice since it affects the structural integrity of the link and causes a reduction in chain strength. Again, because of the use of oversized chain in this case, the missing studs do not prevent continued use as a Class E mooring.



## **MOORING NO. 3**

### **AS-BUILT**

#### **Top Jewelry**

2 1/2-inch F shackle with lugs

#### **Buoy**

12-foot Peg Top

#### **From Bottom of Hawse Pipe**

Five 2-inch A Links

One 2-inch A Link with no stud

Two 2-inch A Links

One 2 1/8-inch Detachable Link

One 2 1/8-inch Swivel

One 2 1/8-inch Detachable Link

One 2-inch A Link

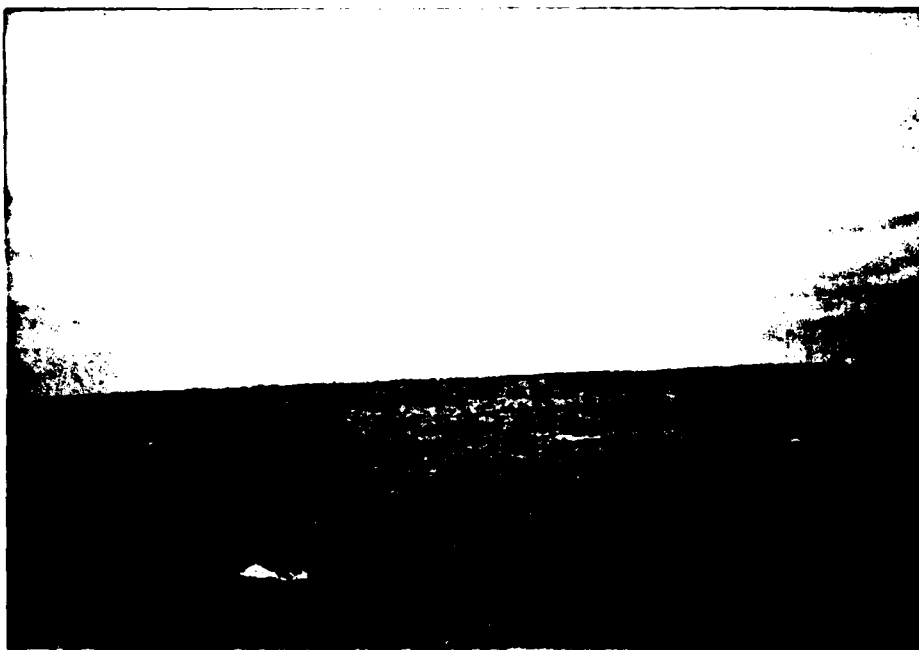
One 2-inch A Link with no stud

Six 2-inch A Links

The remainder of the mooring was buried and not inspected.

**ANNEX B**

**PHOTOGRAPHS**



**1. Mooring Buoys 1 and 2 to the East of Pier 1**



**2. Typical Topside Hardware**



**ANNEX C**

**REFERENCES**

01 02

RR

UUUU

0901900

FROM: CHESNAVFACENGCOM WASHINGTON DC

TO: WPNSTA EARLE COLTS NECK NJ

INFO COMNAVFACENGCOM ALEXANDRIA VA

NORTHNAVFACENGCOM PHILADELPHIA PA

UCT ONE

UNCLAS //N11000//

SUBJ: FLEET MOORING INSPECTION; VISIT REQUEST FOR

A. CHESNAVFACENGCOM WASHINGTON DC 091842Z MAR 83

1. PER REF A, THE SUBJECT INSPECTION WILL OCCUR DURING THE PERIOD 4-10 APR 83. THE INSPECTION TEAM WILL CONSIST OF A SEVEN-MAN DETACHMENT FROM UNDERWATER CONSTRUCTION TEAM ONE (UCT-1) AND A CONTRACTOR ENGINEER-IN-CHARGE (EIC) REPRESENTING THIS COMMAND. THE FIVE MODIFIED "E" CLASS FLEET MOORINGS WILL BE INSPECTED. IN ADDITION A CURSORY INSPECTION OF ANY ON-SHORE FLEET MOORING INVENTORY WILL BE CONDUCTED. THE U. S. COAST GUARD BUOYS ON THE BEACH WILL ALSO BE INSPECTED PER YOUR STATION'S REQUEST.

2. REQUEST WEAPONS STATION PASSES FOR THE BASE AND WATERFRONT AREAS FOR THE VSE CORPORATION OF VIRGINIA (VSE), EIC, MR. THOMAS MCMAHON, [REDACTED]

DISTR:

PII Redacted

DRA: JAMES E MCLAUGHLIN, FPO-1C7  
433-3881 31 MAR 83

SPECIAL INSTRUCTIONS  
COPY TO: 09..00..FPO-1C..FPO-1C7.  
DAILY..0161

RELEASE: E. G. SPENCER & CONSTR PROJ OFF.  
ACTING HEAD, OCEAN ENGR.

SECURITY CLASSIFICATION

DATE TIME GROUP

312045Z MAR 83

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1. 6-11-82 11 1740 1736

02.. 02

RR

UUUU

0901900

U. S. CITIZEN, SECRET SECURITY CLEARANCE. UCT-1 HAS SENT A ROSTER BY SEPCOR. ALSO REQUEST CAMERA AUTHORIZATION FOR PROJECT DOCUMENTATION FOR THIS INSPECTION. ALL PHOTOS WILL BE FOR OFFICIAL NAVY USE ONLY.

3. POINT OF CONTACT AT CHESNAVFACECOM IS MR. J. MCLAUGHLIN, AUTOVON 288-3881 OR (202) 433-3881. POINT OF CONTACT AT WPNSTA, EARLE IS MR. D. BRUNDAGE, AUTOVON 449-1320.

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PAGE	DATE TIME	MONTH	YR	PRIORITY	CLASS	SECT	LM	LT	FILE NO
01 of 02				RR	UUUU				1221310
BUON	MESSAGE HANDLING INSTRUCTIONS								

FROM: CHESNAVFACENGCOM WASHINGTON DC  
 TO: WPNSTA EARLE COLTS NECK NJ  
 INFO: NORTHNAVFACENGCOM PHILADELPHIA PA  
 COMNAVFACENGCOM ALEXANDRIA VA  
 UCT ONE  
 COMCBLANT NORFOLK VA

UNCLAS //N11000//

SUBJ: NWS EARLE; FLEET MOORING INSPECTION

1. WITH THE ASSISTANCE OF UCT ONE DIVERS, THIS COMMAND CONDUCTED AN UNDERWATER INSPECTION OF YOUR THREE MOORINGS DURING THE PERIOD 11-14 APRIL 1983. THIS IS A PRELIMINARY REPORT OF THE INSPECTION FINDINGS.

2. SIGNIFICANT FINDINGS ARE AS FOLLOWS:

A. NONE OF THE BUOYS ARE NUMBERED AND EACH IS PAINTED WITH A DARK GRAY PRIMER COATING. BUOYS HAVE NO RUST AND BOTTOMS ARE GROWTH-FREE. ALL ARE IN GOOD CONDITION.

B. MOORING NUMBER 1. THE WIRE DIAMETER OF THE RISER CHAIN IS 2 1/4 INCHES WHICH IS 1/2 INCH LARGER THAN REQUIRED FOR A CLASS E {1 3/4 INCHES} MOORING. DOUBLE LINK MEASUREMENTS IN THREE POSITIONS

DISTR

Copy available to DTIC does not permit fully legible reproduction

DRAFTER TYPED NAME TITLE OFFICE SYMBOL PHONE <i>James E. McLaughlin</i> (21) JAMES E. MCLAUGHLIN, FP0-1C7 433-3881 2 MAY 1983		SPECIAL INSTRUCTIONS COPY TO: 09..00..FP0-1C..FP0-1C7.. FP0-10P2..DAILY..0161	
E. B. SPENCER, HD, OCEAN ENGR. & CONSTR PROJ. OFF. {A} SIGNATURE <i>[Signature]</i>		SECURITY CLASSIFICATION DATE TIME GROUP 03/05/83	

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02 of 02				RR		UUUU			1221310
MESSAGE HANDLING INSTRUCTIONS									

C. MOORING NUMBER 2. THE WIRE DIAMETER OF THE RISER CHAIN IS ALSO 2 1/4 INCHES. DOUBLE LINK MEASUREMENTS DETERMINED THAT THE CHAIN IS BETWEEN 80 AND 90 PERCENT OF ORIGINAL WIRE DIAMETER. ONLY 19 LINKS ARE VISIBLE BEFORE THE CHAIN ENTERS THE BOTTOM. THE RISER HAS A SWIVEL.

D. MOORING NUMBER 3. THE WIRE DIAMETER OF THE RISER CHAIN IS 2 INCHES AND MEASUREMENTS SHOW THAT THE CHAIN IS BETWEEN 80 AND 90 PERCENT OF ORIGINAL WIRE DIAMETER. ONLY 19 LINKS ARE VISIBLE AND THE RISER HAS A SWIVEL.

3. ALL THREE MOORINGS ARE IN SATISFACTORY CONDITION FOR CONTINUED USE AS CLASS E MOORINGS. AN INSPECTION REPORT WILL BE FORWARDED TO YOUR COMMAND IN APPROXIMATELY FOUR WEEKS.

**DISTR.**

ORASTER TYPED NAME	TITLE	OFFICE SYMBOL	PHONE
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**SPECIAL INSTRUCTIONS**

TYPE	NAME	TITLE	OFFICE	SYMBOL	AND PHONE
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**SIGNATURE**

**SECURITY CLASSIFICATION**

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